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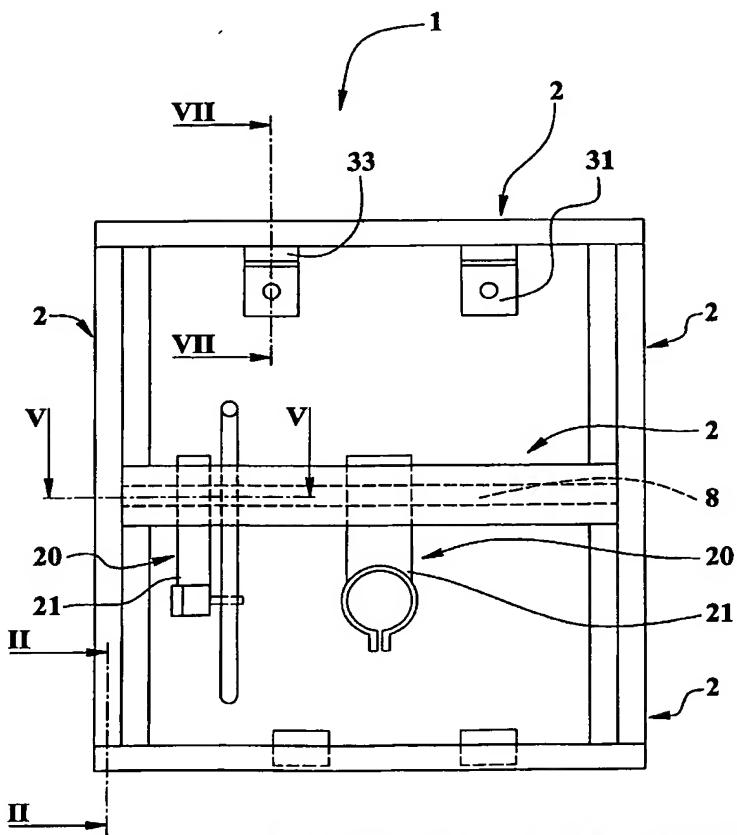
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(54) Title: WALL DEVICE FOR FITTINGS





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WALL DEVICE FOR FITTINGS**TECHNICAL FIELD**

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The present invention relates to the devices used in the building manufacturing and restructuring. Particularly, the invention refers to a wall for fittings; fit for housing and supporting pipes, ducts, hydro thermo sanitary apparatuses, cables, wires, technological nets.

10

BACKGROUND ART

There are known devices, generally used in the building manufacturing and restructurings, constituted by structures or frameworks which are embedded and/or fixed to the walls in order 15 to accommodate and support fittings, for instance pipes and sanitary equipments. Said frameworks allow to make easier and quicker to install and assembly hydro thermo sanitary elements, such as sinks, hygienic cups, reservoirs, bidet or white goods for instance boilers, washers, or ducts for the conditioning system or the passage of electric and signal cables.

20 Once completed the connection of the fittings, the frameworks are then embedded or covered by fixed casing panels or by a second layer of wall.

The main drawback of said known device consists in that they do not allow changes or variants of the structure or the framework especially after the installation.

25

Other drawback of the known devices consists in the elements having predefined and standard dimensions, which cannot be customized or modified, according to the elements to be fixed and the characteristics of the place to be built and/or restructured.

30 Further drawback consists in that said known devices cannot be easily inspected and, in case of maintenance interventions of the inner fittings therein, they require many masonry works firstly destructive and afterwards reconstructive.

35 Other drawback of the known devices consists in that they require heavy works during the installation and assemblage phase and a suitable prearrangement and preparation of the walls,

inside which said device must be inserted, in correspondence of appropriate embedding or seats.

DISCLOSURE OF THE INVENTION

5

The main object of the present invention is to propose a wall device for fixtures and fittings which is adjustable and customizable according to specific constructive requirements, and fit to be modified and also easily changed after the installation and the assemblage.

10 Other object is to propose a device, which can be fixed to an existing wall, requiring a minimum rearrangement of the preexisting walls, both in construction phase and in restructuring phase.

Further object is to propose a device fit to constitute a self-supporting independent wall.

15 Other object is that to propose a device having detachable covering panels, in order to allow an easy and quick installation and inspection of the inner pipes and ducts and the hydro thermo sanitary apparatuses supported thereby.

The above-mentioned objects are achieved according to the content of the claims.

20

BRIEF DESCRIPTION OF THE DRAWINGS

25 The characteristics of the invention are underlined in the following with particular reference to the attached drawings, in which:

- figure 1 shows a front view of the wall device for fittings, and the like, of the present invention;
- figure 2 shows a partial section view according to line II-II of figure 1;
- 30 - figure 3 shows a plant view of a plate mean of figure 2;
- figure 4 shows a section view according to line IV-IV of figure 2;
- figure 5 shows a partial section view according to line V-V of figure 1;
- figure 6 shows a back view of connection means of the figure 1 device;
- figure 7 shows a section partial view according to line VII-VII of figure 1;
- 35 - figure 8 shows a front view of a variant of the figure 1 device;

- figure 9 shows a partial section view according to line IX-IX of figure 8;
- figure 9A shows a partial section view of a variant of third fixing means of figure 9;
- figure 10 shows a partial section view according to line X-X of figure 8;
- figure 11 shows a partial section view of a variant of second fixing means of figure 5;
- 5 - figure 12 shows a partial section view of a variant of a first channel section and of second fixing means of the figure 5 device;
- figure 13 shows a view of fourth fixing means of the figure 1 device associated to second channel sections in which some parts have been removed for better underlining others;
- figure 14 shows a partial section view according to line XIV-XIV of figure 13;
- 10 - figure 15 shows an axonometric view of the fourth fixing means of figure 13;
- figures 16 and 17 show respectively a side view and partial section view according to line XVII-XVII of figure 16 of a variant of the first fixing means of the device of figure 1;
- figure 18 shows a partial cross section view of a further variant of the device of figure 1;
- figure 19 shows a partial section view of removable hanging means of the device;
- 15 - figure 20 shows an axonometric view of a further variant of the first fixing means of the figure 1 device;
- figure 21 shows a partial axonometric view of the variant of figure 20 connected to channel sections;
- figure 22 shows a variant of figure 20 fixing means;
- 20 - figure 23 shows a further variant of figure 20 fixing means;
- figure 24 shows a variant of a channel section of figure 2.

BEST MODE OF CARRYING OUT THE INVENTION

25 With reference to figures from 1 to 7, numeral 1 indicates the wall device for fittings, for instance ducts, wirings, sinks, hygienic vases, heaters, white goods and the like, known and not shown, substantially constituted by horizontal and vertical uprights 2, mutually connected through adjustable first fixing means 10. The device includes connection means 20 fit for 30 connecting the fittings to the uprights 2.

Each vertical upright 2 is constituted by a first channel section 5 or by a second channel section 6, whose each one including, starting from a respective bottom side 50, two respective opposed side parts 51 and almost orthogonal to the bottom side 50 and two first portions 52 parallel to 35 the bottom side 50.

The bottom side 50, the side parts 51 and the first portions 52 define respectively a cavity 55 and a longitudinal opening 8 fit for housing the first fixing means 10 and for the connection means 20.

5

At least a first portion 52 of each first channel section 5 has also a second portion 53 orthogonal to the first portion 52 and facing outward the respective cavity 55. The second portions 53 of the first channel section 5 are carried out in a single body with the latter, by appropriately folding said channel section.

10

In the preferred embodiment the wall device 1 object of the present invention includes two vertical uprights 2, constituted by first channel sections 5, and two horizontal uprights 2, each one consisting of the second channel section 6.

15

The device further has a middle horizontal upright 2 carried out by a second channel section 6 and fit for supporting, through the connection means 20, fittings, ducts, hydro thermo sanitary elements.

20

It is provided that each of the section channel 5, 6 has in correspondence of the bottom side 50 one or more windows 57, fit to allow and make easier the introduction and the passage inside and through the device of pipes, ducts, wirings.

25

The connection between a second channel section 6 and a first channel section 5 or a second channel section 6 of the uprights 2 is carried out by the first fixing means 10, each one constituted by a plate mean 15, having a nearly rectangular shape, which can be insert inside the cavity 55 of the second channel section 6 and removably connected to a first "U" shaped bracket mean 16, which can be fit inside the cavity 55 of the channel section 5, 6. The plate mean 15 and the bracket mean 16 clamp, by clamping means 7, for instance screws or bolts, the first portions 52 of the channel section 6, blocking the second channel section 6 to the first fixing means 10. A sliding fixed joint between the fixing means 10 and channel section 5 is carried out by inserting the ends of the bracket mean 16 into the cavity 55 of the channel section 5.

30

The connection between a first channel section 5 and a second channel section 6 can be carried out through second fixing means 11, constituted by the plate mean 15 and by an abutment mean

17, removably connected, through clamping means 7, in such way to clamp the second portion 53 of the first channel section 5 to the first portions 52 of a second channel section 6. In this case, tightening the clamping means 7, the two channel sections 5, 6 are reciprocally blocked.

5 The second fixing means 11, as shown in figure 11, can include spacer means 23 which can be interposed between the clamping means 7 and the related abutment mean 17 and allow to distribute more uniformly the clamping pressure on the portions of the channel section to block.

10 The plate mean 15 has two flat faces or chamfers 46, for instance flat and parallel, carried out in correspondence of two opposed vertexes of the same plate, to allow the rotation of the latter in operational position, after the insertion in the cavity 55 through the longitudinal slot 8.

15 There are provided third fixing means 12, shown in figure 9, to allow connecting a first channel section 5 to a first channel section 5 or to a second channel section 6. The fixing means 12 are constituted by a second bracket mean 18, "U" shaped and inserted inside the cavity 55 of the first channel section 5; the second bracket mean 18 is removably connected, through the clamping means 7, to inserting means 19 fit inside the cavity 55 of the remaining channel section 5, 6.

20 In alternative, as shown in figure 9A, the third fixing means 12 can be constituted by a plate mean 15, inserted inside the cavity 55 of the first channel section 5 and connected, through clamping means 7, to inserting means 19, consisting of a channel section portion with hollow rectangular section, inserted inside the cavity 55 of the remaining channel section 5, 6.

25 The end of the second bracket mean 18 and the inserting means 19 clamp the second portions 53 of the channel section 5, blocking the latter to the first fixing means 10. The insertion of the inserting means 19 in the cavity 55 of the channel section 5, 6 carries out a sliding fixes joint between the fixing means 10 and said channel section.

30 Referring to figures from 20 to 22, the device 1 includes sixth fixing means 13, consisting of a "C" shaped element, which can be inserted inside the first channel section 5 and is provided with at least a couple of lateral slots 113, allowing the insertion, by rotations, of the first portions 52 of a second channel section 6.

35 The end, close to lateral slots 113, of central wall of sixth fixing means 13 has a first recess 114

fit for avoiding interferences with eventual nuts or screw head for fixing the second channel section 6 to the ceiling or to the floor.

5 The inner end of the first recess 114 has a tab 116 protruding outwards to form a stop for the first channel section 5; alternatively the inner ends of lateral slots 113 can be provided with corresponding tabs 115, protruding outwards to form a stop.

The end of central wall of sixth fixing means 13, opposed to lateral slots 113, has a second recess 117, fit for making easier the assemblage operations.

10 The fixing means 13 of figure 23, consists of a parallelepiped shaped element made of solid plastic and having one free end provided with a housing mean 118 consisting of a slot for a protrusion of a related coupling mean 119 which can be inserted inside the first channel section 5. Housing mean 118 and coupling mean 119 are provided with respective holes 120 for a fixing 15 pin 121 or screw.

20 The channel section 5 of figure 24 has, in correspondence of the window 57, a removable portion 61 fit for the insertion of elements, like pipes or tubes, inside the window 57 in an installation condition of the channel section 5, 6. The removable portion 61 is fixed to the channel section 5, 6 by means of screw, nuts and washer.

The wall device 1 can be embedded into a suitable opening or cavity in a wall 60, or can be simply leaned against the latter.

25 The fixing of the device to the wall 60 is carried out through a plurality of fasten means 30, whose each one is constituted by a plate mean 15, inserted in the cavity 55 of an second channel section 6 and removably connected to a "L" shaped bracket mean 31, through clamping means 7. The bracket mean 31 is fixed to the wall 60 by means of screws or wedges, of known type, and it has a slot 32 for allowing the regulation of the clamping means 7 position and, 30 consequently, the distance of the device 1 from the wall 60. Such characteristic is particularly advantageous in the case in which said wall have noticeable shape irregularities.

35 Each connection mean 20 includes a support 21, which is detachably connected through clamping means 7, to a plate mean 15 inserted in the cavity 55 of a second channel section 6 of a middle horizontal upright 2. In order to avoid the rotation of the support 21 with respect to the

upright 2, it is provided an anti-rotation bracket 22, U shaped and connected to the support 21, whose ends are inserted in the longitudinal slot 8 of the related channel section 6, for avoiding the rotation of the connection mean 20.

5 The device further includes fourth fixing means 25, shown in figures 13-15, fit for adjustably connecting second channel sections 6 to first channel section 5 or second channel section 6. Each fourth fixing mean 25 includes a first portion 26 characterized by a transversal seat 28, fit for accommodating a first portion 52 of a channel section 6 and a protrusion 27, almost orthogonal to said transversal seat 28 and which can be inserted inside the cavity 55 of a
10 corresponding channel section 5, 6. Threaded means block the fourth fixing mean 25 to the portion 52 of the channel section 6, once defined the related position of the two channel section.

There are provided covering panels 4, for instance made of Fermacell or vibrated cement or asbestos gypsum, fixed to the uprights 2, and particularly positioned against the portions 52, 53
15 of the first 5 and second 6 channel sections, to which they are constrained by threaded connections of known type.

Sealing means can be interposed between the first 5 and second 6 channel sections and the panels 4.

20 The figures from 8 to 10 show a variant of the wall device 1 characterized by two horizontal uprights, upper and middle, constituted by first channel section 5, and by a vertical middle upright consisting of a second channel section 6. The vertical uprights are carried out by two first channel section 5 sideways coupled with the interposition of a abutment spacer 29 and
25 connected to connection means 24, consisting for instance of a U shaped bracket, containing the edges 52, 53 and is blocked in position by clamping means, which sideways contact said first portions 52.

30 The connection between the channel section 6 of the middle vertical upright and the channel sections 5 of the two horizontal uprights is carried out by clamping the portions 52, 53 between an abutment plate 33 inserted inside the cavity 55 of the channel section 6 and the abutment mean 17.

35 In this case the wall device 1 is inserted into a passing through or blind space carried out in the wall 60, to which it is sideways clamped by lock means 59, of known type, screwed or welded

or glued to channel sections 5, 6 of the device 1.

There are further provided L shaped bracket 34 of known type, fit for mutually irremovably connecting the vertical and horizontal uprights 2 in such a way to give to the device 1 a rigid

5 and fixed structure.

Another variant of the device 1, shown in figure 12, provides the use of a first channel section 5 in which the second portion 53 consists in a shaped channel section 66, fixed to an inner protrusion 56 of a corresponding first portion 52.

10

A variant of the first fixing means 10, shown in the figures 16 and 17, provides that the first bracket mean 16 is constituted by two separate portions, reciprocally rotatably coupled and connected respectively to the plate mean 15 and to a channel section 5, 6. The two portions can reciprocally rotate around an axis nearly orthogonal to the plane defined by the device 1, and 15 they allow in this way to adjust the inclination of an horizontal upright 2 with respect to the vertical uprights, for instance when the device 1 must be inserted in an room having sloping ceiling, such as an attic, a garret, a closet.

20

Fifth fixing means 40 connect the first channel section 5 to another first channel section 5 or second channel section 6. The fifth fixing means 40 are substantially constituted by a nearly U shaped connection element 41, whose portion is inserted inside the cavity of a channel section 5, 6, while the remaining portion mates the bottom side 50 of the channel section 5 and is blocked to the latter. Particularly, the element 41 is blocked to the inner protrusion 56 of the portion 52 of the channel section 5 by means of an insert 42, adjacent to the portion 52, to which said insert 25 42 is removably connected d by a screw. It is further provided a spacer element 43 interposed between the screw head and the connection element 41 and between the latter and the insert 42, guarantying a more stable clamping of the fixing means 40.

30

The figure 18 shows a further variant of the wall device 1 including spacing means 35 of uprights 2, side by side positioned and fit to form a space 36 delimited by said horizontal and vertical uprights 2. The space 36 is used for housing fittings, wirings, pipes or carries out an interspace for the ventilation, usable for the summer and winter conditioning of the room in which the device is inserted.

35

The covering panels 4 are screwed to the uprights 2 or, referring to figure 19, the covering

panels 4 are removably fixed to horizontal uprights 2 by means of a plurality of hanging means 9. Each hanging means includes a "S" shaped section element, fixed to the covering panel 4 by means of screws to form a side for an horizontal uprights 2, consisting of a second channel section 6.

5

There are provided in this variant insulation panels 37, whose ends are inserted and fixed, for instance by glueing or by screws, in the longitudinal openings 8 of the channel section 5, 6 which constitute the uprights 2. Covering panels 4 are provided on the external sides of the device 1, while further insulation panels, for instance made of polystyrene, or separation panels 10 38, made of cement material or the like, can be inserted inside the interspace 35.

The main advantage of the present invention is to provide a wall device for fixtures and fittings, which is adjustable and customizable according to specific constructive requirements, and fit to be modified and also easily changed after the installation and the assemblage.

15

Other advantage is to provide a device, which can be fixed to an existing wall, requiring a minimum prearrangement of the preexisting walls, both in construction phase and in restructuring phase.

20

Further advantage is to provide a device fit to constitute a self-supporting independent wall.

Other advantage is to provide a device having detachable covering panels, in order to allow an easy and quick installation and inspection of the inner pipes and ducts and the hydro thermo sanitary apparatuses supported thereby.

25

CLAIMS

1) Wall device for fittings characterized in that includes:

- a plurality of horizontal and vertical uprights (2) mutually coupled by at least first
5 adjustable fixing means (10);
- connection means (20) for joining the fittings;

the uprights (2) including at least a first channel section (5) and a second channel section (6), each one including, starting from a respective bottom side (50), two respective opposed side parts (51) and nearly orthogonal to the bottom side (50), two respective first portions (52) parallel to the bottom side (50); said sides, parts and portions (50, 51, 52) of the at least first (5) and second (6) channel sections defining respective cavities (55) and longitudinal openings (8) for the first fixing means (10) and for the connection means (20); at least a first portion (52) of each first channel section having also a second portion (53) orthogonal to the first portions (52) and facing outwards the respective cavity (55).

15

2) Device according to claim 1 characterized in that the second portions (53) of the first channel section (5) are carried out in a single body with the latter.

20

3) Device according to the claim 1 characterized in that the at least second portion (53) consists of a shaped channel section (66) fixed to an inner protrusion (56) of a correspondent first portion (52).

25

4) Device according to the claim 1 characterized in that includes two vertical uprights (2), each one consisting of a first channel section (5), and two horizontal uprights (2), each one consisting of a second channel section (6).

5) Device according to the claim 1 characterized in that each channel section (5, 6) has in correspondence of the bottom side (50) at least a window (57).

30

6) Device according to the claim 1 characterized in that the first fixing means (10) are fit for connecting a second channel section (6) to an upright (2) and they consist of a plate mean (15), which can be insert inside the cavity (55) of the second channel section (6) and is removably connected, through clamping means (7), to a first bracket mean (16), which can be fit inside the cavity (55) of the upright (2).

7) Device according to claim 1 characterized in that includes second fixing means (11) consisting of a plate mean (15) and an abutment mean (17), removably connected through clamping means (7) and fit for clamping the second portions (53) of a first channel section (5) and the first portions (52) of a second channel section (6).

5

8) Device according to claim 6 or claim 7 characterized in that the plate mean (15) has a nearly rectangular shape with at least two flat faces (46), carried out in correspondence of two opposite vertexes of the same plate.

10 9) Device according to claim 1 characterized in that includes third fixing means (12), fit for connecting two channel section (5, 6) and consisting of a second U shaped bracket mean (18), which can be insert inside the cavity (55) of the first channel section (5) and is removably connected, through clamping means (7), to inserting means (19), which can be fit inside the cavity (55) of the remaining channel section (5, 6).

15

10) Device according to any of the claims from 7 to 9 characterized in that the clamping means (7) include screws or bolts.

20 11) Device according to claim 7 characterized in that the second fixing means (11) include spacer means (23) interposed at least between the abutment mean (17) and the second channel section (6).

25 12) Device according to claim 6 characterized in that the first bracket mean (16) includes two portions, rotatably coupled and connected respectively to a plate mean (15) and to a channel section (5, 6).

30 13) Device according to claim 1 characterized in that includes sixth fixing means (13), consisting of an element which can be associated to the first channel section (5) and is provided with at least a couple of lateral slots (113) for inserting, by rotation, the first portions (52) of a second channel section (6).

14) Device according to claim 13 characterized in that the end, close to lateral slots (113), of central wall of sixth fixing means (13) has a first recess (114).

35 15) Device according to claim 13 characterized in that the fixing means (13) consists of a "C"

shaped element which can be inserted inside the first channel section (5).

16) Device according to claim 15 characterized in that the inner ends of lateral slots (113) have corresponding tabs (115) protruding outwards to form a stop for the first channel section 5 (5).

17) Device according to claims 14 and 15 characterized in that the inner end of the first recess (114) has a corresponding tab (116) protruding outwards to form a stop for the first channel section (5).

10

18) Device according to claim 14 characterized in that the end of central wall of sixth fixing means (13), opposed to lateral slots (113), has a second recess (117).

15

19) Device according to claim 13 characterized in that the fixing means (13) consists of a parallelepiped shaped element.

20) Device according to claim 19 characterized in that one free end of fixing means (13) is provided with a housing mean (118) for a related coupling mean (119) which can be inserted inside a channel section (5, 6).

20

21) Device according to claim 20 characterized in that housing mean (118) and coupling mean (119) are provided with respective holes (120) for a fixing pin (121).

25

22) Device according to claim 1 characterized in that includes a plurality of fasten means (30) fit for fixing the device (1) to a wall (60).

23) Device according to claim 22 characterized in that each fasten mean (30) includes a plate mean (15), inserted in the cavity (55) of the second channel section (6) and removably connected to a L shaped bracket mean (31), by clamping means (7).

30

24) Device according to claim 23 characterized in that the L shaped bracket mean (31) includes at least a slot (32) for the clamping means (7).

35

25) Device according to claim 1 characterized in that includes a plurality of lock means (59) fit for fixing the device (1) to a space of a wall (60).

26) Device according to claim 1 characterized in that includes connection means (24) connecting two side by side positioned first channel sections (5).

5 27) Device according to claim 1 characterized in that each connection mean (20) includes at least a support (21) of at least a respective fitting element, removably connected to a plate mean (15), inserted in the cavity (55) of a second channel section (6), through clamping means (7).

10 28) Device according to claim 27 characterized in that the connection means (20) include at least a anti-rotation bracket (22), connected to the support (21) and partially inserted in the longitudinal opening (8) of the related channel section (6).

15 29) Device according to claim 1 characterized in that includes fourth fixing means (25) each having a first portion (26), having at least a transversal seat (28), fit for housing a part of a first portion (52) of a second channel section (6), and a protrusion (27), almost orthogonal to said transversal seat (28) and which can be inserted inside the cavity (55) of a respective channel section (5, 6).

20 30) Device according to claim 29 characterized in that the fourth fixing means (25) include threaded means for blocking the portion (52).

25 31) Device according to claims 3 characterized in that include fifth fixing means (40), fit for connecting two channel section (5, 6), and including at least an U shaped connection element (41), a first portion of which is removably connected by clamping means (7), to an insert (42), for blocking the inner protrusion (56) of a first channel section (5), and whose remaining portion is inserted inside the cavity (55) of the remaining channel section (5, 6).

30 32) Device according to claim 31 characterized in that the fixing means (40) further include a shaped spacer element (43) interposed between the clamping means (7) and the connection element (41), and between the latter and the insert (42).

35 33) Device according to claim 1 characterized in that includes third fixing means (12), fit for connecting two channel section (5, 6) and consisting of a plate mean (15), inserted inside the cavity (55) of a first channel section (5) and connected by clamping means (7) to

inserting means (19), fit inside the cavity (55) of the remaining channel section (5, 6).

34) Device according to claim 9 or 33 characterized in that the inserting means (19) consist of a channel section portion with rectangular cross section.

5

35) Device according to claim 1 characterized in that includes at least a covering panel (4) fixed to the uprights (2).

10 36) Device according to claim 35 characterized in that the covering panels (4) are screwed to the vertical uprights (2).

37) Device according to claim 35 characterized in that the covering panels (4) are removably fixed to horizontal uprights (2) by means of a plurality of hanging means (9).

15 38) Device according to claim 37 characterized in that each hanging mean (9) includes a "S" shaped section element fixed to the covering panel (4) by means of screws in order to form a side for a horizontal uprights (2), consisting of a second channel section (6).

20 39) Device according to claim 1 characterized in that include at least an insulation panel (37) whose peripheral portions are inserted inside the longitudinal openings (8) of the channel sections (5, 6).

25 40) Device according to claim 1 or claim 39 characterized in that includes spacing means (35) of uprights (2), side by side positioned and fit to form a space (36) delimited by said uprights (2).

41) Device according to according to claim 37 characterized in that includes sealing means interposed between the uprights (2) and the panels (4).

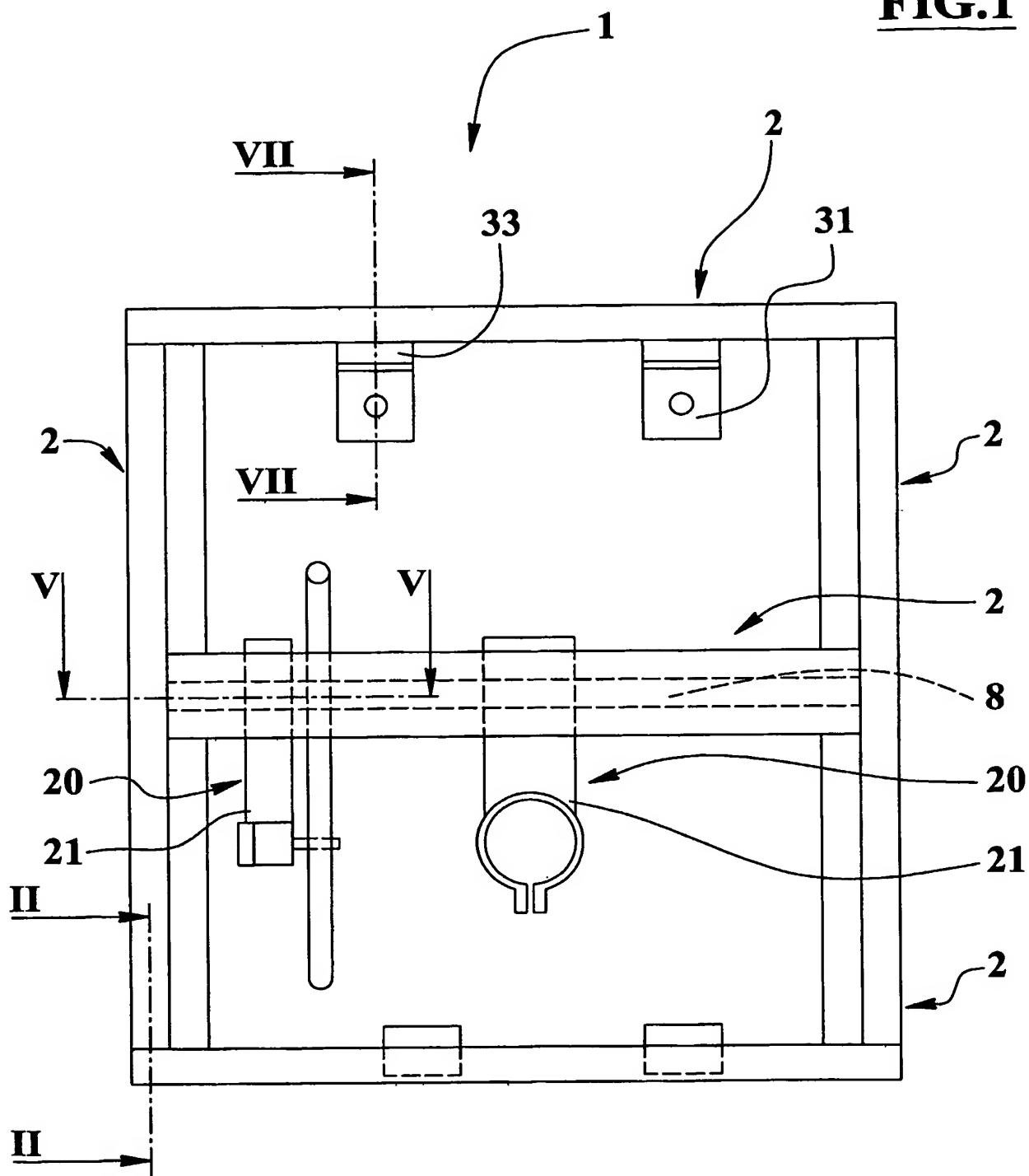
30 42) Device according to claim 26 characterized in that the connection means (24) include an U shaped element and screw means of side abutment of the first portions (52) of the first channel section (5).

35 43) Device according to claim 42 characterized in that the connection means (24) include an abutment spacer (29) of the side parts (51) of the first channel sections (5) for reciprocally

spacing apart said side parts.

- 44) Device according to claim 5 characterized in that each channel section (5, 6) has, in correspondence of the window (57), a removable portion (61) fit for the insertion of elements inside the window (57).
- 5
- 45) Device according to claim 44 characterized in that the removable portion (61) is fixed to the channel section (5, 6) by means of screw, nuts and washer.

1/13

FIG.1

2/13

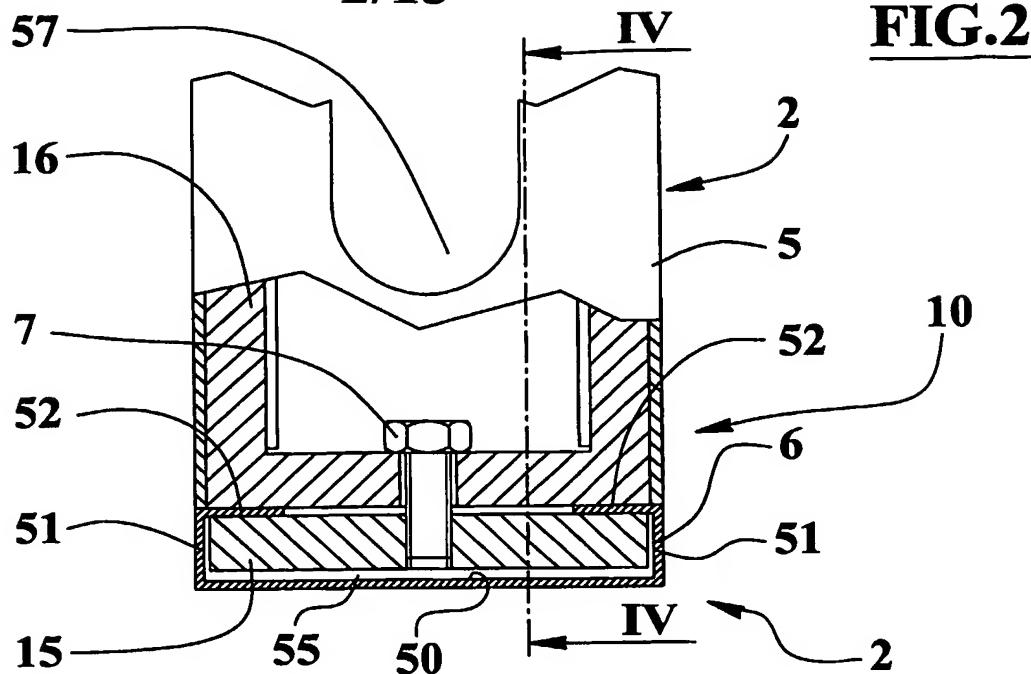


FIG.3

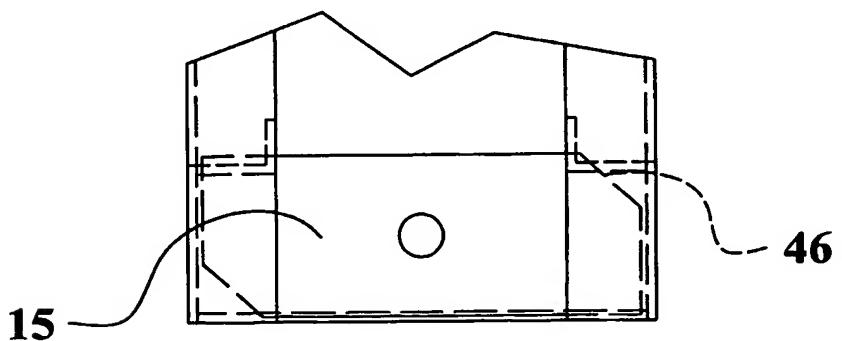
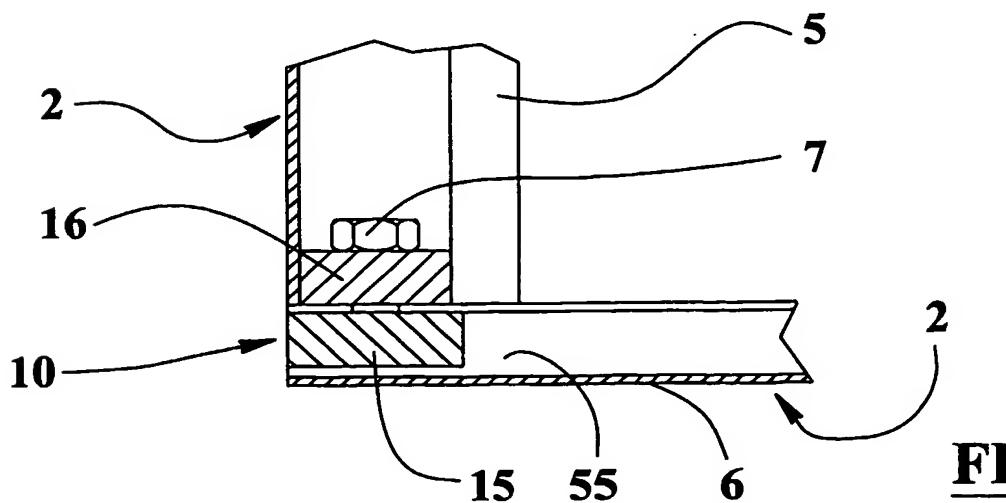
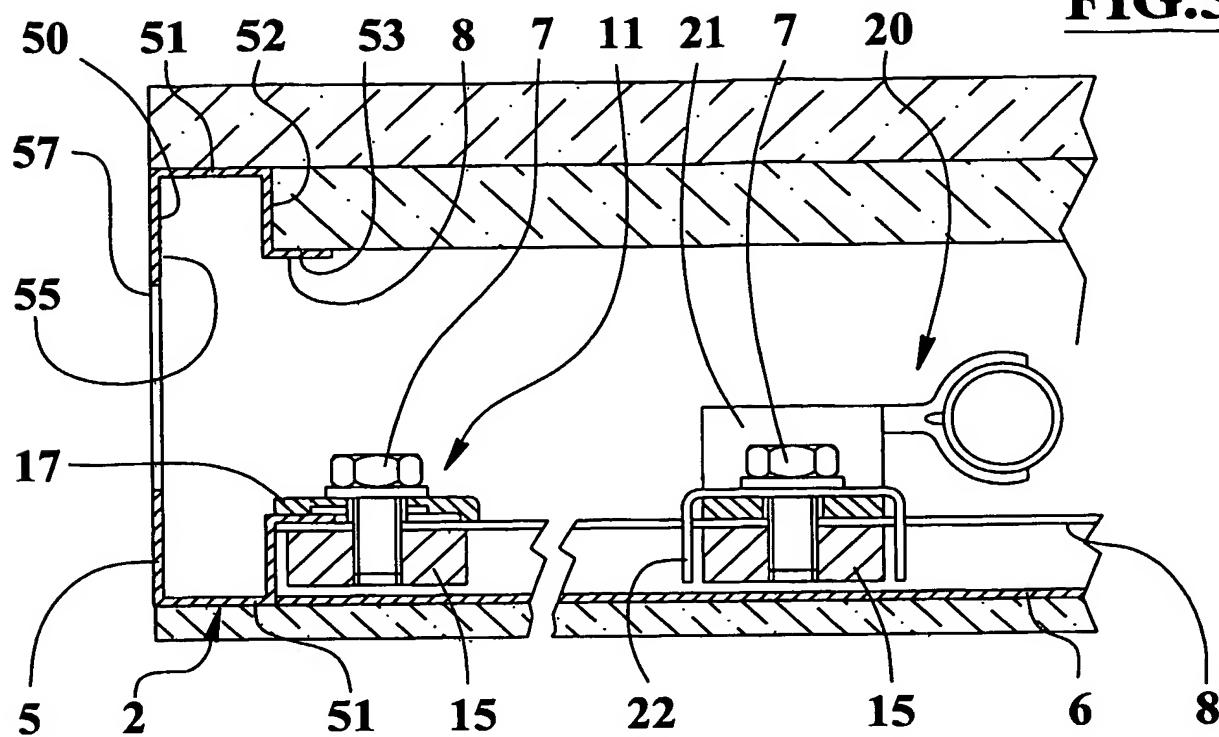
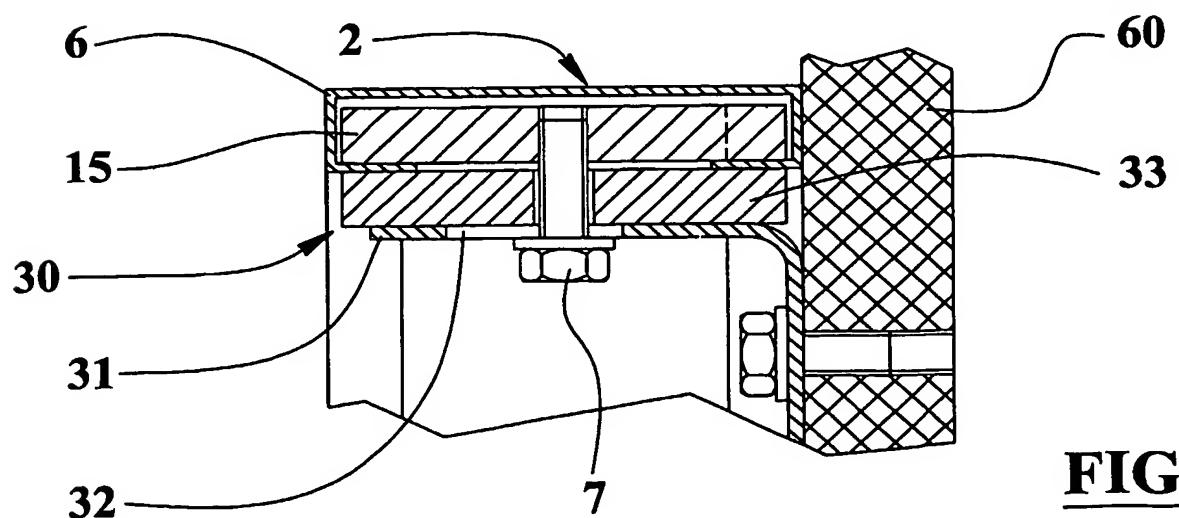
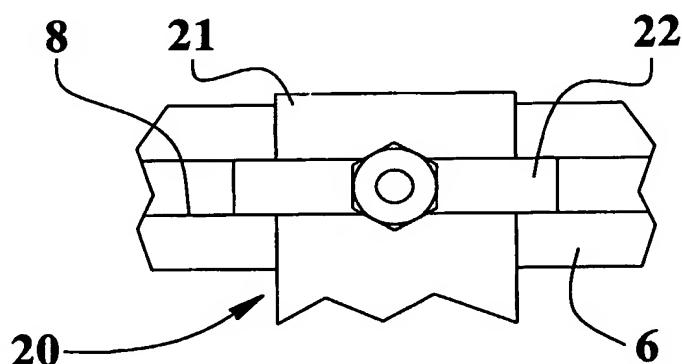


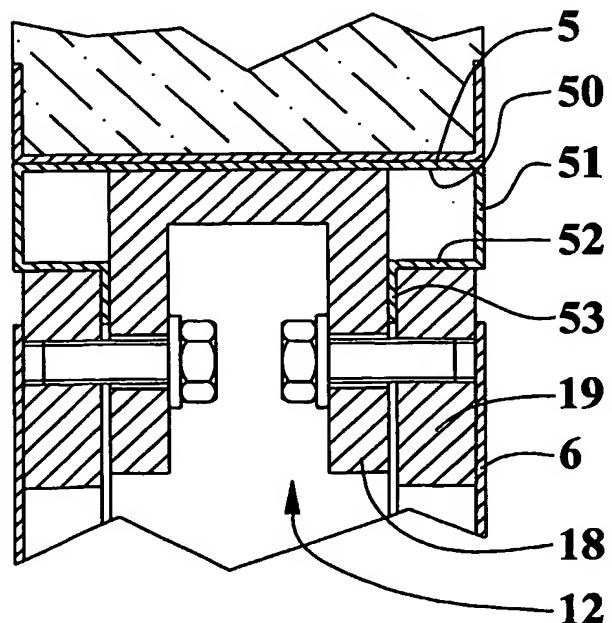
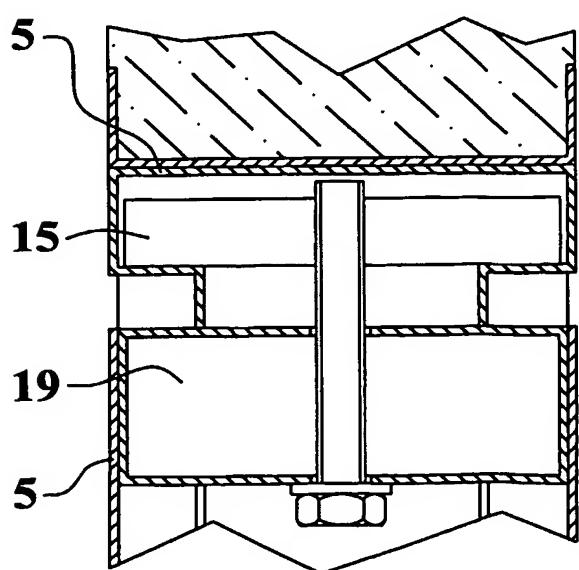
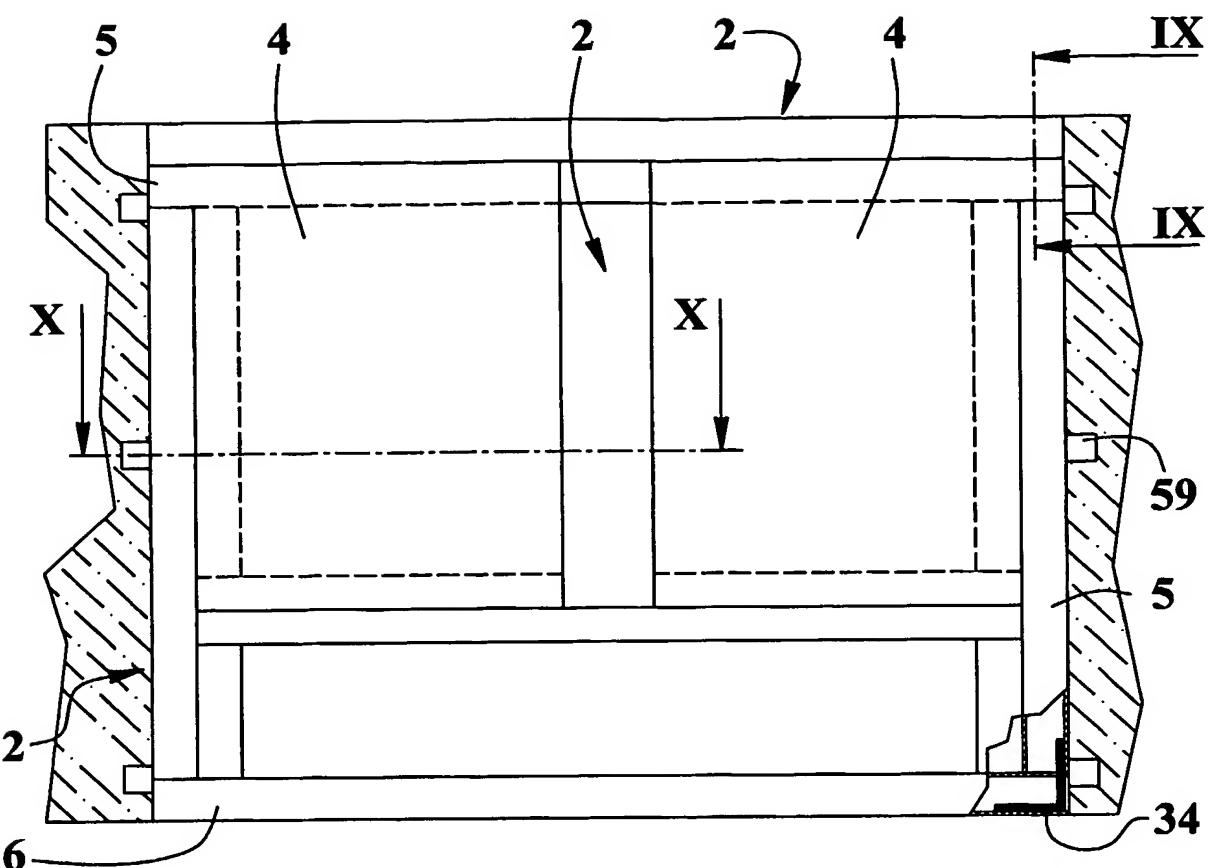
FIG.4

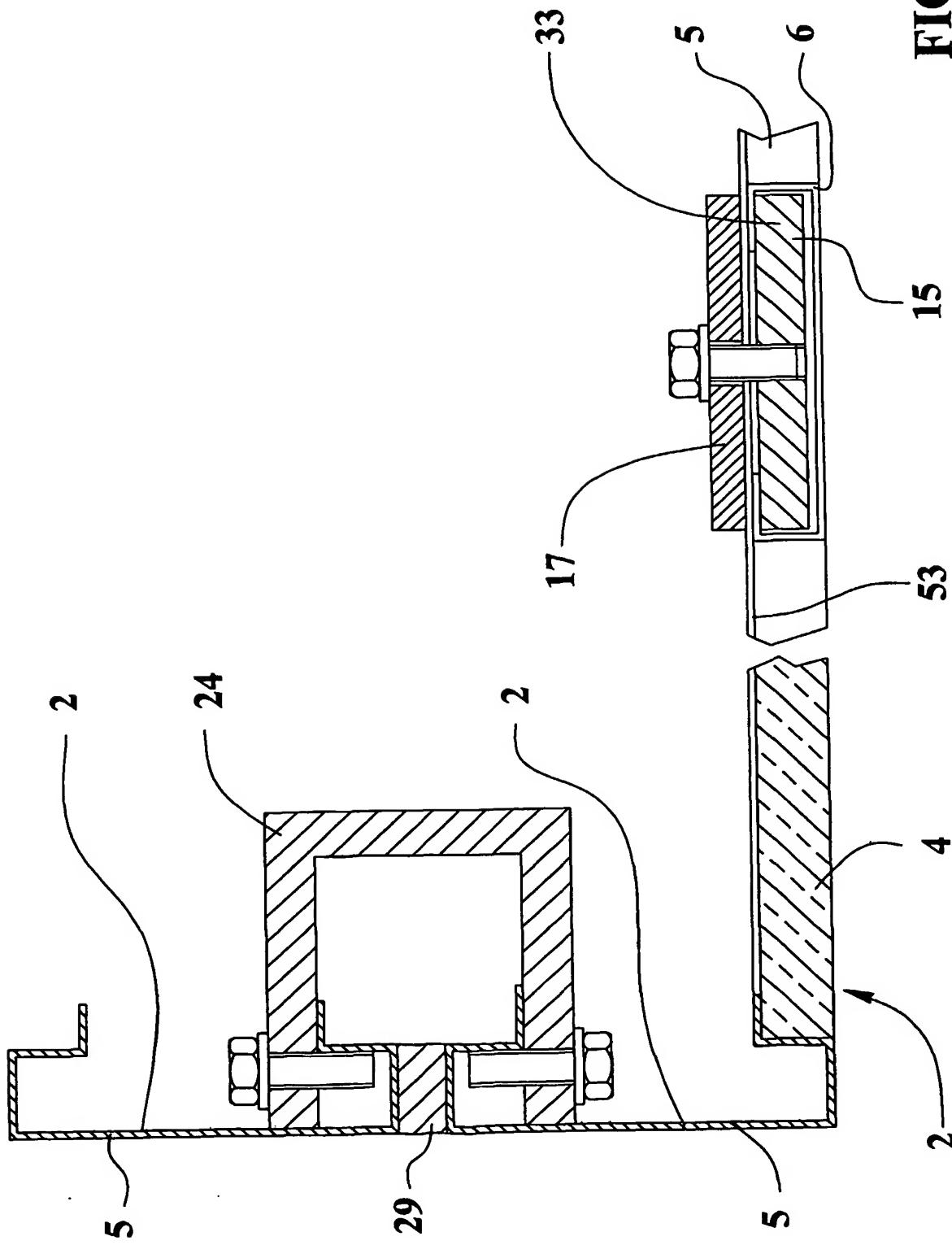


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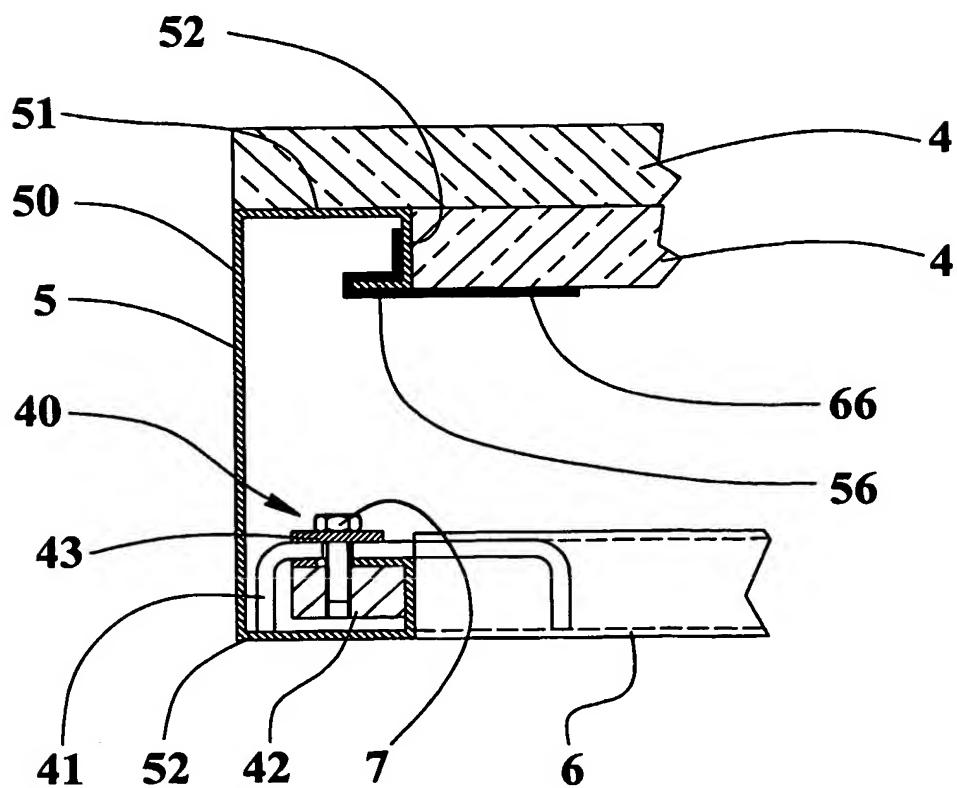
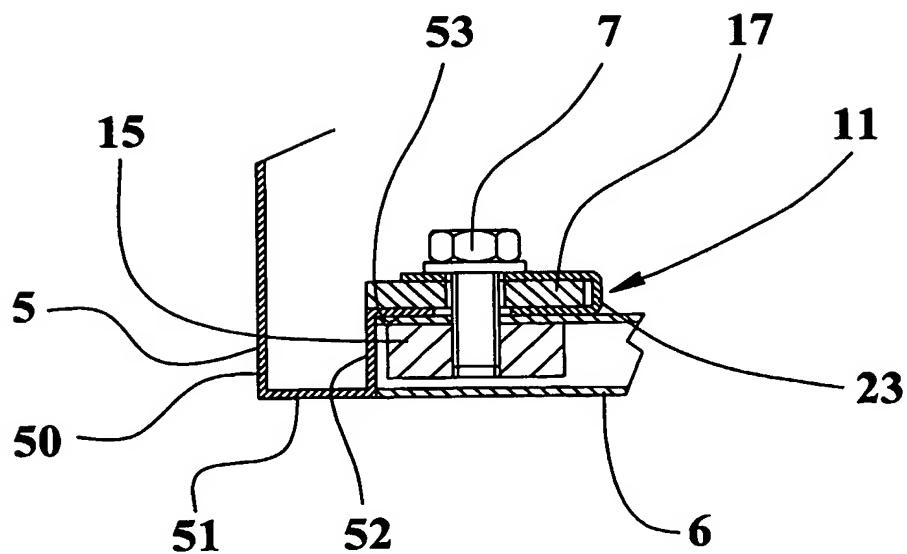
FIG.5**FIG.6****FIG.7**

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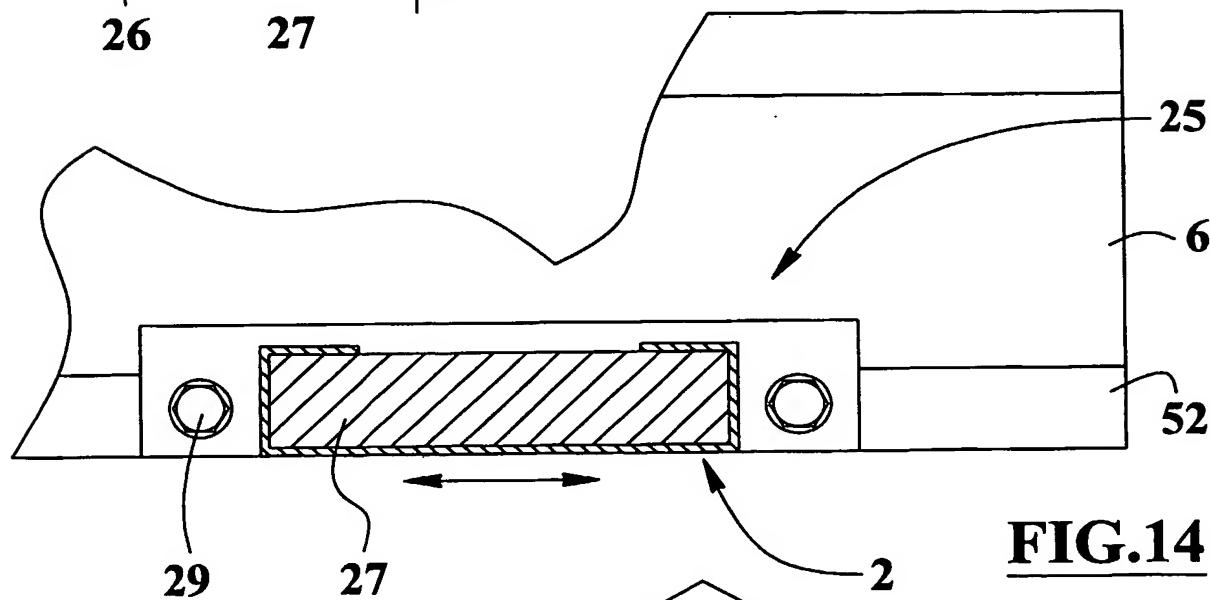
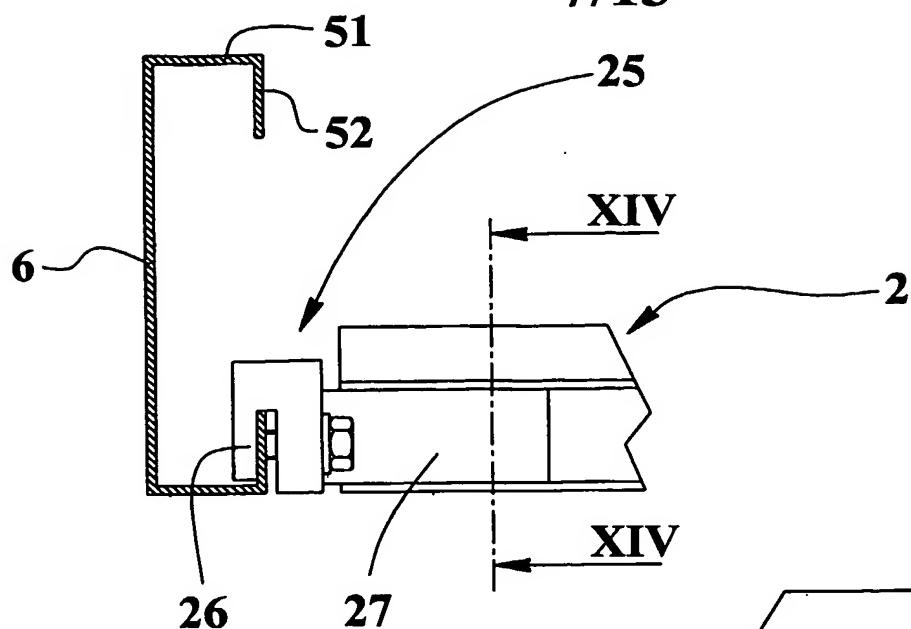
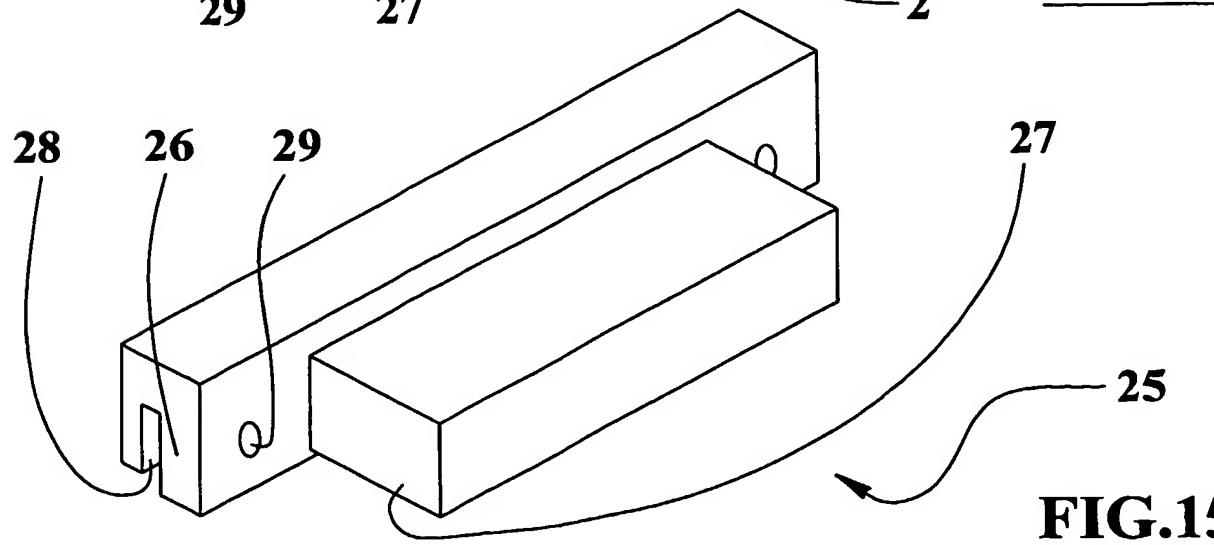
FIG.8FIG.9AFIG.9



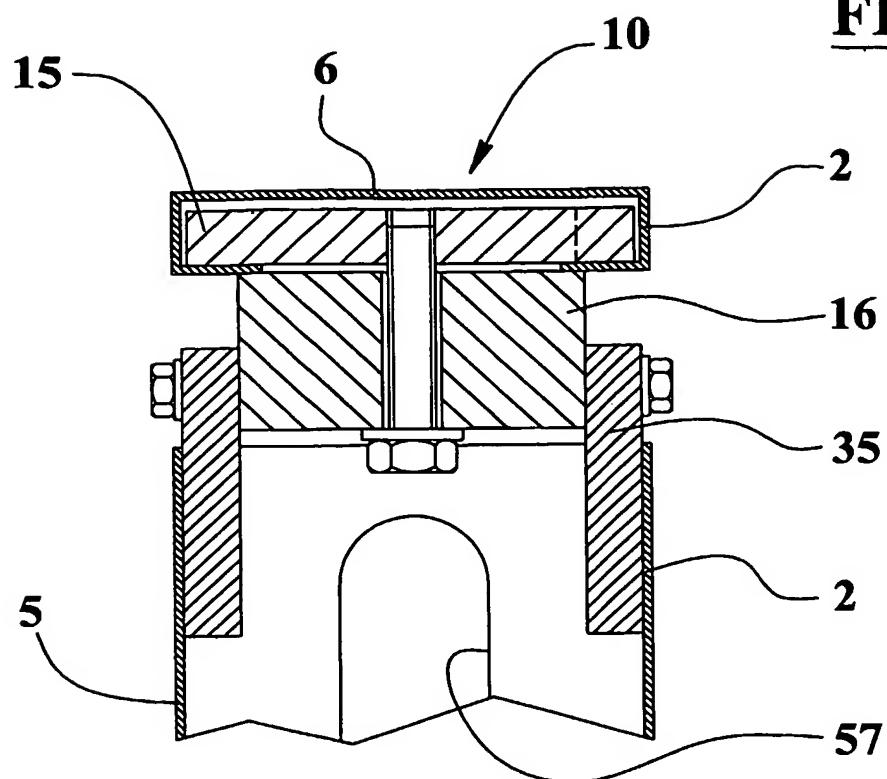
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FIG.11FIG.12

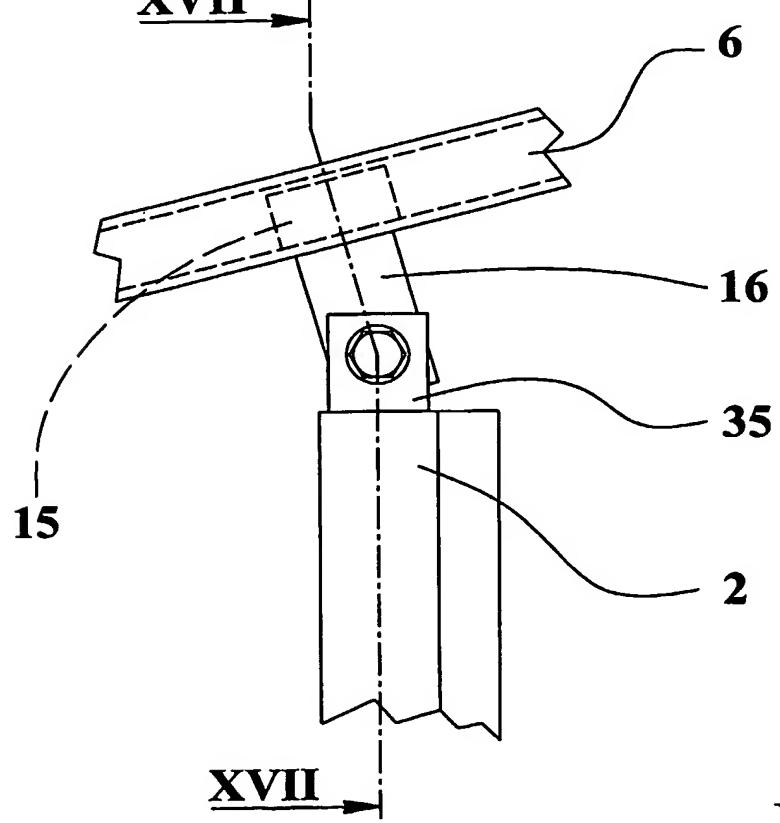
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FIG.13FIG.14FIG.15

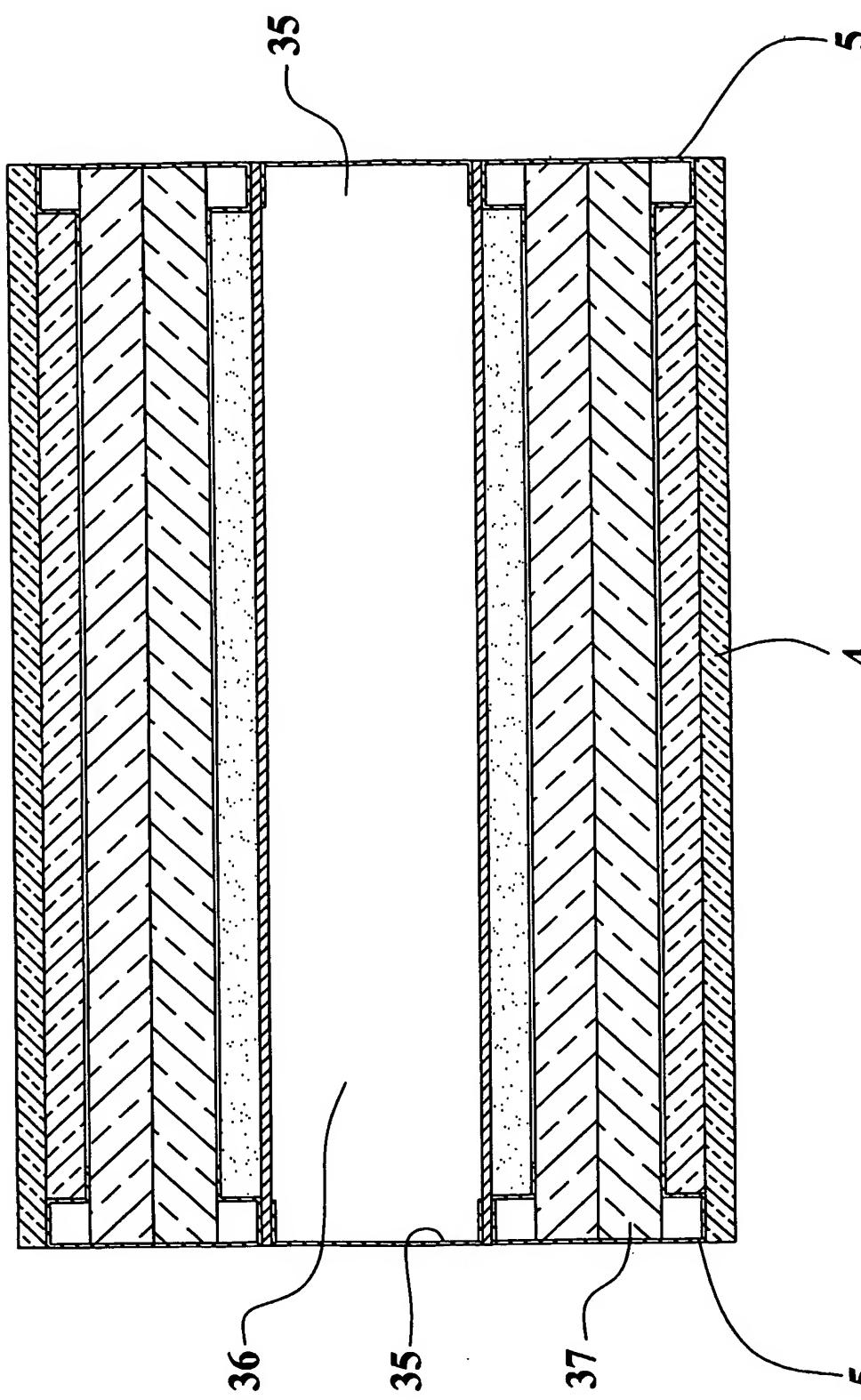
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FIG.17

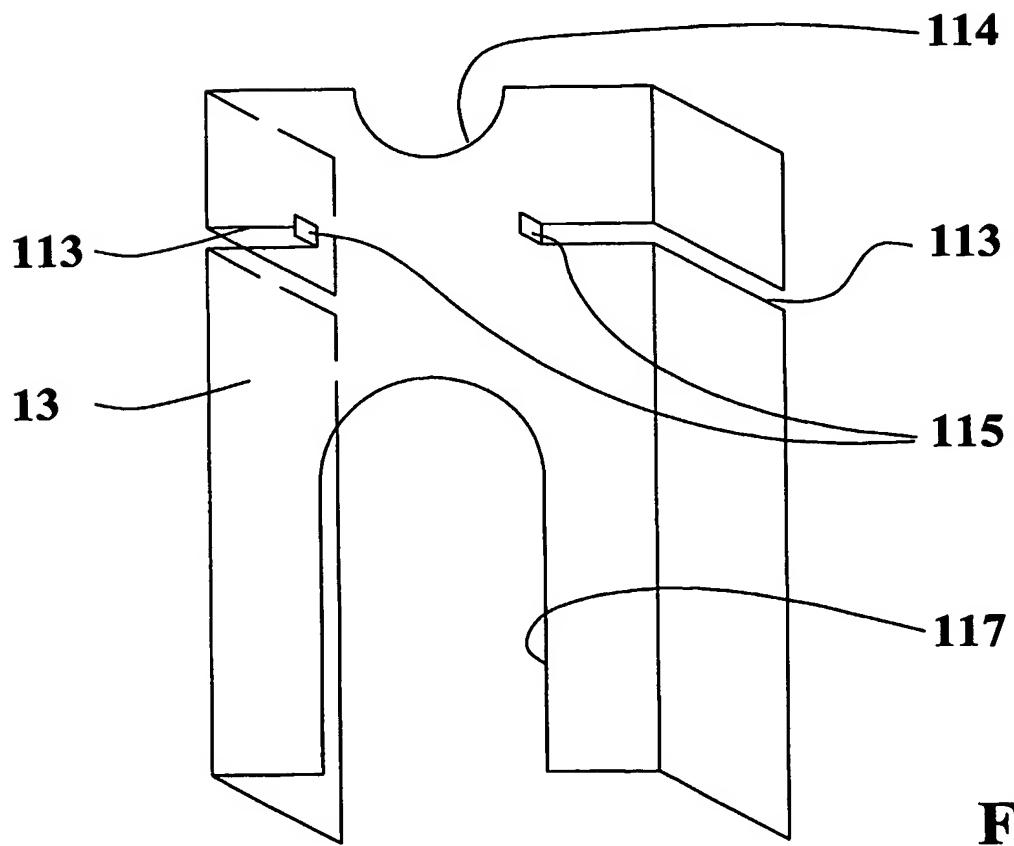
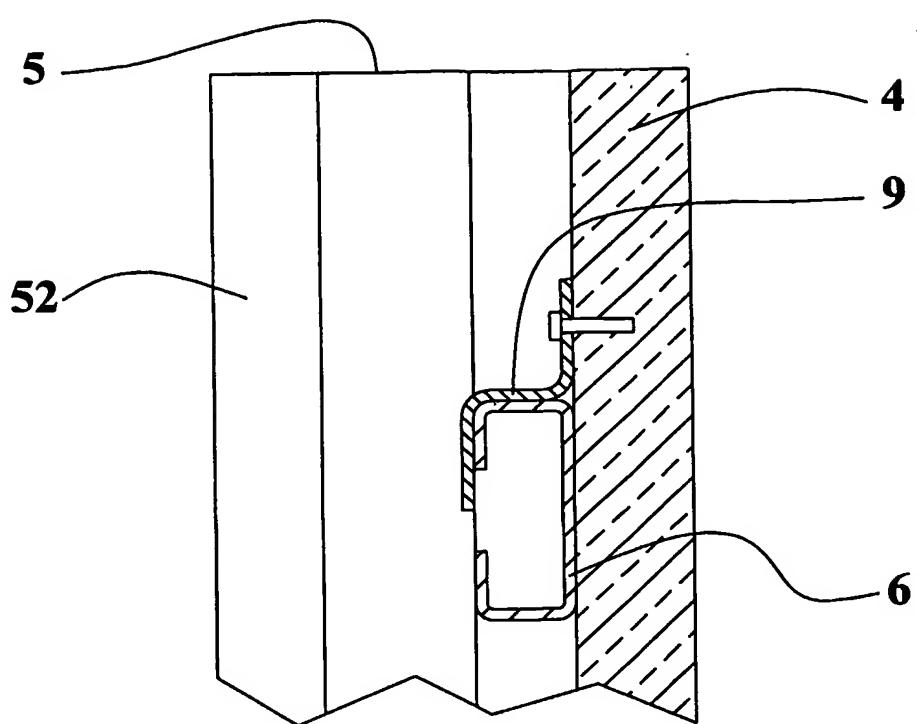
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FIG.16

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FIG.18

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FIG.19FIG.20

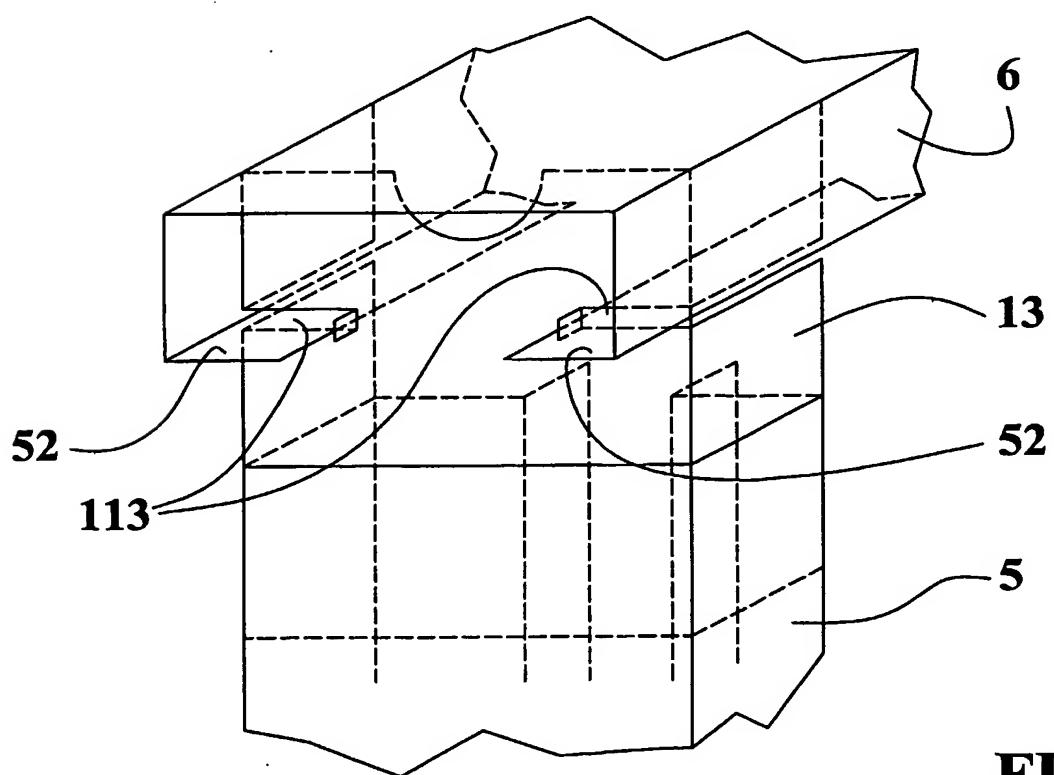
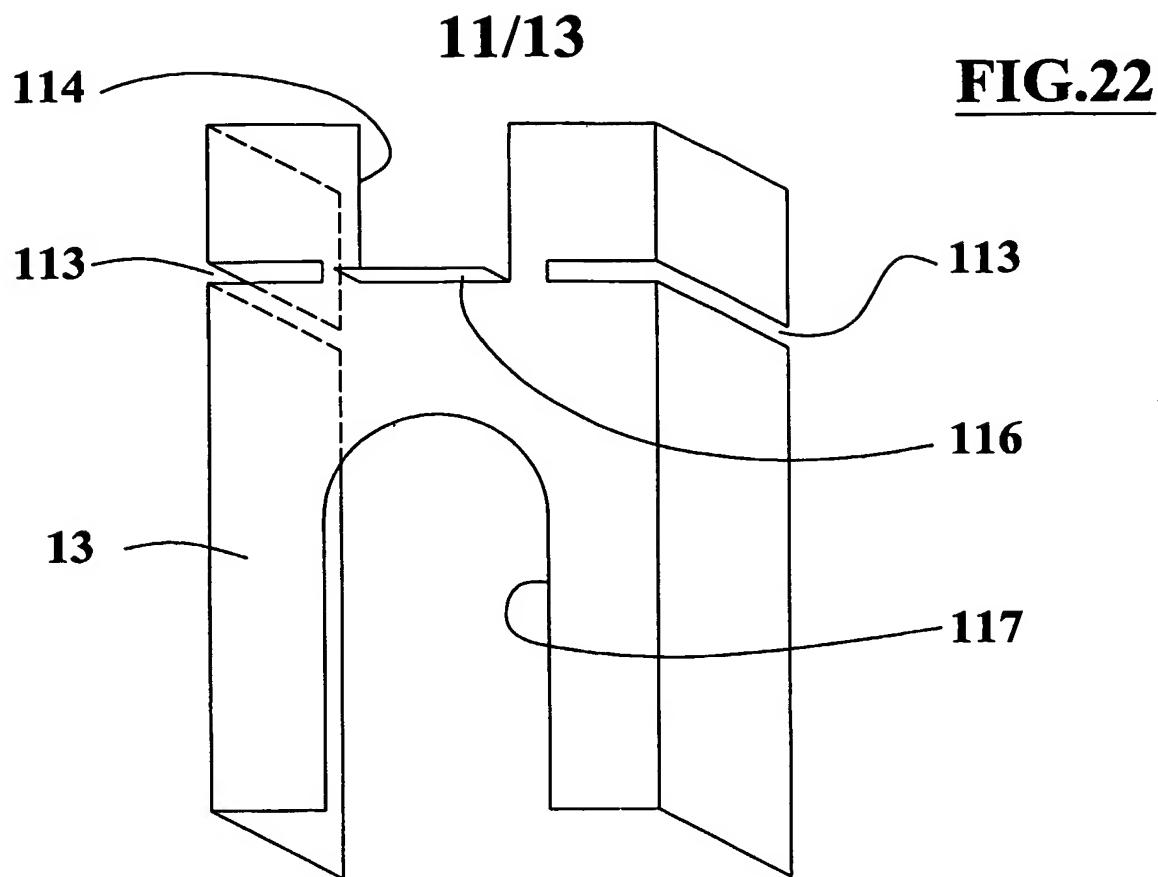
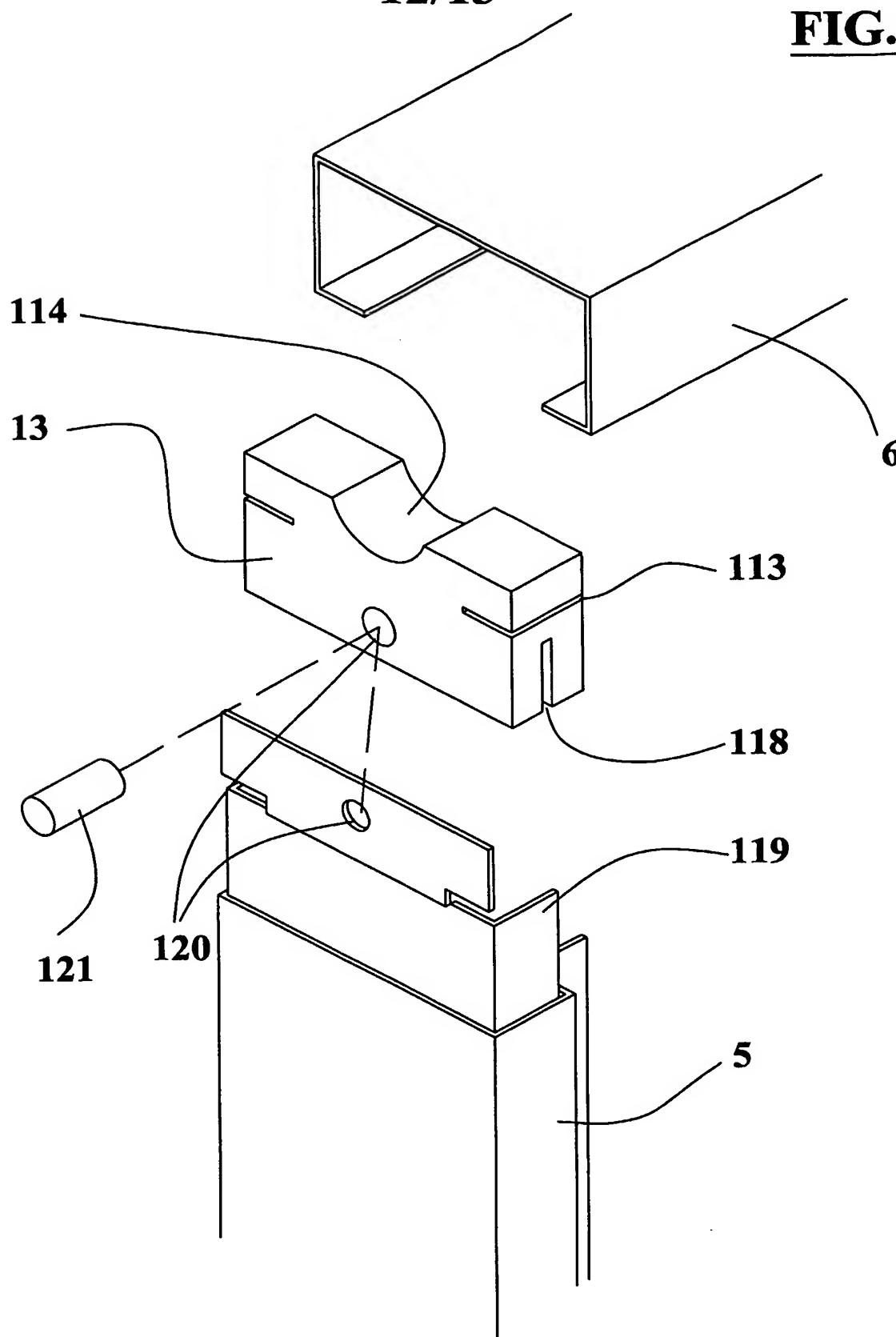
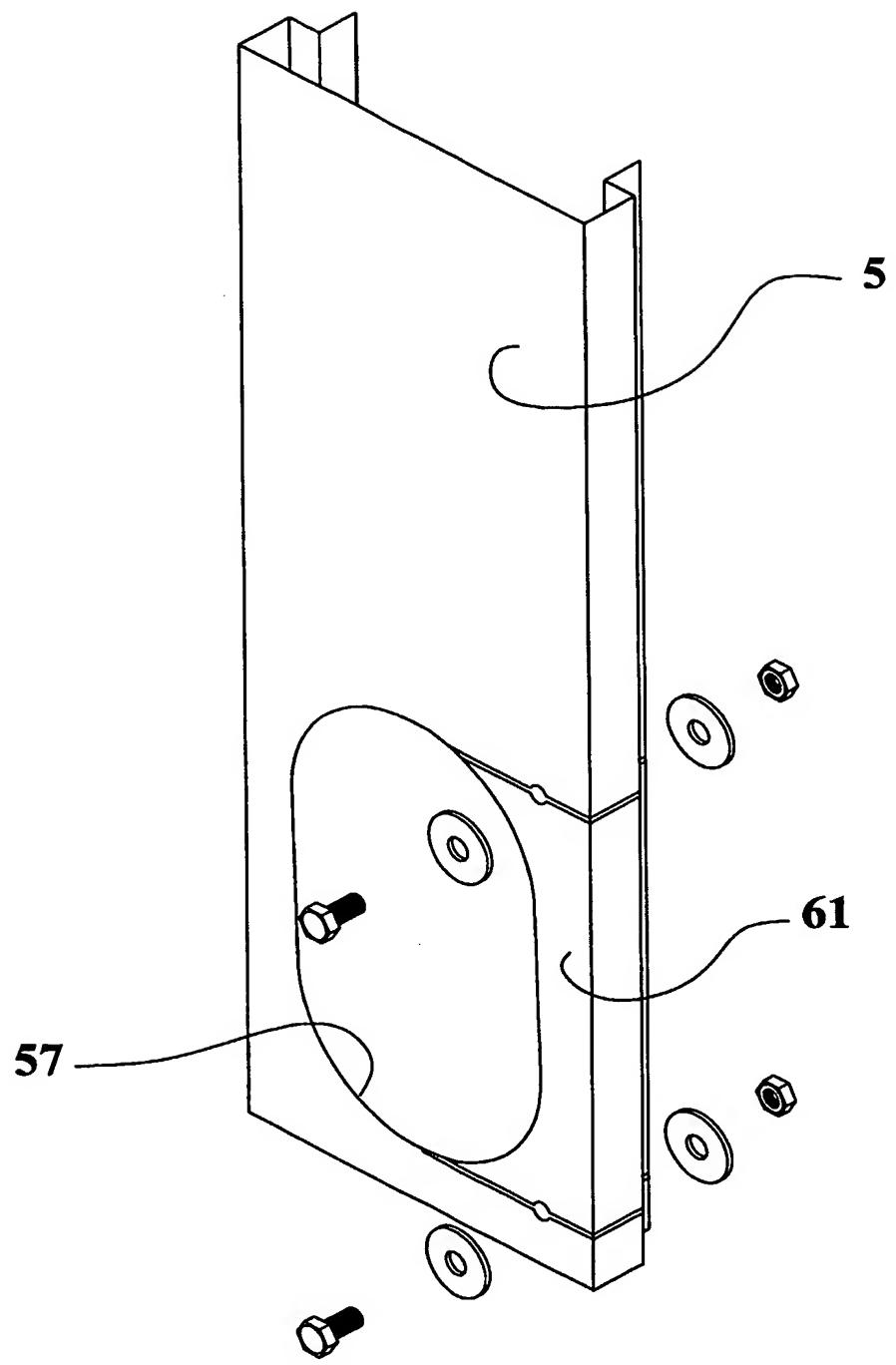


FIG.21

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FIG.23

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FIG.24

INTERNATIONAL SEARCH REPORT

PCT/IB 02/05667

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 E06B1/12 H02G3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 E06B H02G E02G

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Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 187 490 A (MCLOUGHLIN JOSEPH N ET AL) 16 January 1940 (1940-01-16) page 1, paragraph 1; figure 2 -----	1-45
A	EP 0 243 642 A (ROMPLER BURDA GMBH FA) 4 November 1987 (1987-11-04) figures 1,7,9 -----	1-45
A	US 6 101 773 A (CHAU THEODORE Q ET AL) 15 August 2000 (2000-08-15) figure 6 -----	1-47
A	US 5 426 904 A (GILMORE THOMAS M) 27 June 1995 (1995-06-27) figure 5 -----	37,38

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Information on patent family members

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